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RESOURCE MANAGEMENT SYSTEM QUALITY CRITERIA

INTRODUCTION

This section identifies the minimum level of treatment necessary to achieve a resource management system (RMS). Quality criteria are established that will protect soil, water, air, plant, and animal resources. These quality criteria are applicable to all land uses.

A RMS is a combination of conservation practices and resource management that when applied, will meet or exceed minimum criteria for all identified resource concerns. The RMS will be considered applied when all of the conservation practices that make up the system have been installed according to the pertinent Practice Standards in Section IV, Field Office Technical Guide (FOTG).

In addition to quality criteria, human considerations and environmental concerns must be addressed while developing a RMS. A Resource Management System Check List-Human Considerations is included for use in formulating and evaluating resource management system alternatives.

Although not specifically stated in each quality criteria, all RMS alternatives must be formulated within applicable federal, state, and local laws and regulations. The use and implementation of these criteria will be consistent with federal, state, and local laws and regulations.

In some instances, the individual landowner cannot solve an existing resource problem without the participation of other landowners. In those cases, the requirements for a RMS will be met when the actions of the landowner are no longer contributing to the problem.

RMS quality criteria consist of 2 components:

1. **DEFINITION**-a statement of the nature of the resource concern

2. **INDICATORS**-evaluation tools with quantitative and qualitative levels that will achieve resource protection. A list of indicators is provided for all RMS quality criteria. An indicator is a specific evaluation tool (procedure, worksheet, model, calculation, or methodology.) The list is not all-inclusive.

    - **Quantitative Levels** are expressed when well developed evaluation methodologies exist.

    - **Qualitative Levels** are a statement of the desired outcome of evaluation methodologies, conservation practices, and resource management to address the identified resource concern. Qualitative levels apply to all listed indicators.

Visual observation, deductive reasoning, and professional judgment are essential components of all RMS quality criteria. The planner sometimes has to rely on reason and common sense to deduce a best estimate of what is believed to be the status of a resource. This is largely because of the absence of quantitative procedures or tools or the impracticability of applying known methods. For example, restricted capacity of water bodies may not be a practical resource consideration to measure, nor are predictive tools available. However, the planner can deduce whether a problem exists or not based on other sources of information. For example, RUSLE shows that very low rates of soil erosion are occurring throughout the watershed. The planner can deduce that there is no significant source of sediment. A significant reduction in storage capacity of a reservoir because of sediment deposition within the water body is not probable. The planner must frequently rely on deductive methods to address off-site effects.

Another example of using a deductive approach in determining resource conditions is related to treatment standards. In this case the planner must assume that a certain condition is met if specific treatment is applied, and, conversely, if the specific treatment is not applied, a different and less desirable condition will result.

RESOURCE MANAGEMENT SYSTEM CHECK LIST-HUMAN CONSIDERATIONS

A. ECONOMICS

1. Cost Effectiveness

There is a reasonable relationship between the cost of the system and the changes in resource conditions it brings about.

2. Financial Condition

There is an ability to acquire funds to install and maintain the system over time without destroying the financial viability of normal farm/ranch operations.

3. Markets

There are adequate and available markets for affected farm/ranch enterprise products.

4. Input Level

There are adequate or sufficient management skills, land, labor, materials, and equipment present or obtainable to operate and maintain the system.

5. Base Acreage

Base acreage for USDA programs is adequately maintained.

6. USDA Programs

The system would not preclude a normal degree of participation in USDA programs.

7. Sustainability

There is a reasonable expectation of long-term profitability for the operation as a whole.

B. SOCIAL

1. Public Health and Safety

Local community standards regarding public health and safety are followed.

2. Traditional Values

Social, family, religious values, peer pressure, and societal goals are considered.

3. Client Characteristics

Client characteristics including age, planning horizon, special emphasis groups, and resources (limited and otherwise) are considered.

4. Risk Tolerance/Aversion

The degree of risk is reasonable compared to the alternatives.

5. Tenure

Tenure (owner or renter) or time availability (e.g. part-time, absentee) does not affect the ability to install, manage, or maintain the system.

C. CULTURAL

1. Absence or Presence

Absence or presence of cultural resources is established using the State Historic Preservation Officer's (SHIPO) definition of cultural resources.

2. Significance

When presence is established, qualified cultural resources personnel will determine significance according to the National Register of Historic Places criteria.

3. Neutral or Positive Effects

The system can be applied to an area containing significant cultural resource if it has a neutral or positive effect on that resource.

4. Negative Effect/Mitigation

Systems can be applied if negative effect is avoided or mitigation occurs to lessen or eliminate those negative effects as agreed to by consulting parties (GM 420 Part 401).

RESOURCE MANAGEMENT SYSTEM QUALITY CRITERIA

A. SOIL

A.1. Erosion

A.1.a, A.1.b, and A.1.f. Sheet and Rill, Wind and Irrigation Induced

DEFINITION: The movement of soil from wind and water forces. Irrigation-induced includes erosion that is caused by excessive amounts and/or velocities of water in row, furrow, and sprinkler activities or by water conveyances and tracks from center pivots and traveling guns.

Cropland Erosion Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
RUSLE+WEQ+(FUSED, ERO)	<= T for the planned rotation (Tons/Acre/Year)	*Cropland;* The composite erosion rate for sheet and rill, wind, and irrigation-induced erosion will be at a rate that is agronomically feasible and sustains the soil resource.

Hayland and Pastureland Erosion Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
RUSLE+WEQ+(FUSED, ERO)	<= 1 ton/acre/year for the rotation	*Hayland, Pastureland;* The movement of soil from wind and water forces will approximate natural conditions.

Rangeland, Forestland, and Recreationland Erosion Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
RUSLE+WEQ	<= 1 ton/acre/year	*Rangeland, Forestland, Wildlifeland, Recreationland;* The movement of soil from wind and water forces will approximate the rate expected under natural conditions.

A.1.c. Ephemeral Gully/Concentrated Flow

DEFINITION: Concentrated flow channels along depressional watercourses that begin where overland flow, including rills, converge. Concentrated flow channels can usually be obscured by tillage operations. Channels that cannot be repaired with normal tillage operations are classic gullies.

Cropland Ephemeral Gully/Concentrated Flow Field Application Indicator Tools	**RMS Quality Criteria Level-Quantitative**	**RMS Quality Criteria Level-Qualitative**
Visual inspection		*Cropland;* No excessive erosion. Tools and observation indicate the absence of concentrated flow channels. Alternatively, tools and observation indicate potential concentrated flow channels do not require tillage or maintenance more extensive than on the remaining treatment unit. Tools and observation identify concentrated flow concern areas and provide treatment to control excessive concentrated flow erosion. No recent formation of rills; old rills have blunted or muted features.
Client interview		
Aerial photograph interpretation		
NRCS-Washington Technical Note Engineering 1.	Actual **"V" <= 2.5 fps** for the runoff from a 2 year-24 hour event	

All Other Land; **Ephemeral Gully/Concentrated Flow Field Application Indicator Tools**	**RMS Quality Criteria Level-Quantitative**	**RMS Quality Criteria Level-Qualitative**
Visual inspection		*All other lands:* No discernable erosion. Tools and observation indicate the absence of active concentrated flow channels on the site. No recent formation of rills; old rills have blunted or muted features. Tools and observation identify concentrated flow concern areas and provide treatment to control concentrated flow erosion.
Client interview		
Rangeland Health Ecological Indicator Evaluation Matrix	**Soil/Site Stability** rating of "Functional"	

A.1.d. Classic Gully

DEFINITION: Gullies are channels that may grow or enlarge from year to year by headcutting and lateral widening. Gullies are too deep to be erased by normal operations.

Classic Gully Field Application Indicator Tools	**RMS Quality Criteria Level-Quantitative**	**RMS Quality Criteria Level-Qualitative**
Visual inspection		Tools and observation will use storm events with greater than a ten-year, 24-hour frequency. Tools and observation identify gully erosion areas and gully erosion is controlled by treatment methods selected. Head cutting is stopped, gully side slopes are stabilized, and no active erosion occurs in the channel bottom.
Geologic investigation		
Client interview		
TR20 (storm event Q-runoff)		
Direct Volume Method		
Aerial photo interpretation		

A.1.e. Streambank

DEFINITION: Collapse or mass failure of banks caused by channel constriction, unstable soils, flow obstructions (ice, debris, structures, etc.), or unstable channel bottom.

Streambank Erosion Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Visual inspection		Streambanks are stable and not subject to accelerated erosion. Tools and observation will consider bankfull discharges, as well as storm events with a greater than ten-year frequency. Tools and observations identify streambank erosion hazard areas and streambank erosion is controlled by the treatment methods selected. (Factors contributing to unacceptable conditions must be outside the control of the manager)
Client interview		
Direct Volume Method		
Aerial photo interpretation		
Geologic investigation, including stream geomorphology		
Proper Functioning and Condition (PFC)	*Proper Functioning Condition* Functional Rating or *Functional-At Risk Rating with an Upward Trend*	
Bank Height Ratios (Rosgen 1990)	BHR <=1.1	
Bank Erodibility Hazard Rating Guide (Rosgen 1990)-BEHI	Very Low or Low Rating	
Channel Stability (Pfankuch) Evaluation	Reach Score of Medium Good to Excellent	

A.1.g. Soil Mass Movement

DEFINITION: Soil slippage, landslides, or slope failure, normally on hillsides, in deep cuts or through unstable soil on sloping land that creates a large volume of soil movement.

Soil Mass Movement Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Soil Survey		The land and water management systems shall provide treatment to prevent or minimize soil mass movement. Tools and observations indicate that human inputs and activities do not undercut toe slopes or overload the tops of slopes. This applies to all areas with slopes >15%.
Geologic investigation		
Visual inspection		

A.1.h. Roadbanks, Construction Sites, and Scoured Areas

DEFINITION: The erosion as identified is causing problems and damage, both onsite and offsite.

Roadbanks and Construction Sites Erosion Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Visual inspection	Tools and observation result in treatment that meets the air and water quality resource concern quality criteria.	Roadbanks show no visible erosion and banks are stable. Construction sites are stabilized with vegetative or other materials as needed, so that no discernable sediment is leaving the site. Areas subject to wind and/or water scour erosion more frequently than one year in ten shall be adequately protected or stabilized. Tools and observation identify areas of excessive erosion or areas with high erosion potential. Erosion is controlled by the treatment methods selected.
Erosion Prediction Tools: RUSLE-construction sites, WEQ, WEPP		
Client interview		

A.1.i. Tillage

DEFINITION: The downslope displacement of soil through the action of tillage operations (preparation of ground for planting via mechanical means).

Tillage Erosion Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Gross Erosion Technique		The land and water systems shall provide treatment to prevent or minimize downslope movement of soil. Tools and observation identify areas of excessive erosion or areas with high erosion potential. Erosion is controlled by the treatment methods selected.
Direct Volume Method		

A.2. Condition

A.2.a. Soil Tilth, Crusting, Water Infiltration, Organic Matter

DEFINITION: Unsuitable soil tilth. Soil tilth is the condition of the soil based on suitable combinations of mineral, air, water, and organic mater, resulting in a proper medium in which microbial activity and chemical reactions can occur.

Soil Condition-Soil Tilth, Crusting, Water Infiltration, & Organic Matter Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
NRCS-Washington Technical Note Agronomy 1	A positive soil condition-rating index.	Soil condition will have a trend toward improvement.

A.2.b. Compaction

DEFINITION: Compaction is excessive compressing of soil particles and aggregates by machine, livestock and natural consolidation, thereby affecting plant-soil-moisture-air relationships.

Soil Compaction Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Penetrometer	Tools and observations will indicate that compaction layers are infrequent (<=20% of the areas inspected), thin (< 1 inch thick) and weakly restrictive to water movement and root penetration (Pans will exhibit some penetration by the roots of the existing plant cover).	The soil will have no adverse tillage-pan or compaction-pan pressure, which reduces water infiltration or restricts rooting depth for plants.
Shovel		
Visual inspection		
Professional judgement		
Bulk density measurement		
Auger		

A.2.c, A.2.d, A.2.e, and A.2.f Soil Contaminants: Excess Chemicals, Animal Waste and other Organics, Fertilizer, Pesticides.

DEFINITION: Soil contamination is excess chemical content, salinity, selenium, boron, and heavy metals that restrict the desired use of the soil. Contaminants include desirable and undesirable chemical elements in either organic or inorganic forms.

Soil Contaminants Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Soil test		Soil contaminants are absent, or present at levels that do not adversely affect other resources. Application of all organics and chemicals will be in adherence to all federal, state, and local laws. Tools and observation indicate the desired land use does not require management or maintenance more extensive than those on similar soils do. Plant production is not limited by excessive soil contaminants.
NRCS Washington Water Quality Technical Notes		
Visual inspection		
Leaching Index		
Phosphorus Index		
Screening Tool-Farm-A-Syst		
Pesticide Screening tool-NAPRA		
Soil test (Electrical Conductivity-Ec)		
Pesticide Screening tool-WIN-PST		
Plant response		

A.3. Deposition

A.3.a, A.3.b, A.3.c, and A.3.d Damage Onsite and Offsite; Safety Onsite and Offsite

DEFINITION:
A.3.a: Deposition is the eroded material that has been moved and redeposited to another site. Need to rework ground because of sediment thickness and distribution; crops destroyed; and infertile deposition, especially for coarse textured sediment.
A.3.b: Same as onsite damage (A.3.a). Offsite practice effects are presently less than onsite because of increased distance from source problem.
A.3.c: Deposition on roads and railroads that cause accidents, loss of life, and loss of access for emergency vehicles.
A.3.d: Same as onsite safety (A.3.c). Offsite practice effects are presently less than onsite because of increased distance from source problem.

Deposition Damage and Safety Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Visual inspection		No visual or measurable damage to property, crops, land, or water is apparent. Safety hazards are minimized. Tools and observation identify depositional/damage areas and sources. Excessive deposition/damage is controlled by the treatment methods selected.
Sediment loss from field		
Client interview		

B. WATER

B.1. Quantity

B1.a Excess Amounts – Seeps

DEFINITION: Subsurface water flows onto the surface of the land.

Excess Amounts-Seeps Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Visual inspection		Seeps will be managed to solve discernable plant production, trafficability, slope stability, or concentrated flow erosion problems consistent with all federal, state, and local laws. Tools indicate the desired land use does not require management or maintenance more extensive than on the remaining treatment unit. Plant production is not limited by excess water.
Soil Survey		
Irrigation evaluation		

B.1.b Excess Amounts - Runoff/Flooding

DEFINITION: Water accumulates on the surface of the land.

Excess Amounts-Runoff/Flooding Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Floodplain maps		Water will be controlled to the extent that there is no observable damage to land, crops, or structures. In those instances where management of excess surface water is restricted because of policy and laws such as those pertaining to wetlands and riparian areas, the criteria will be met if policy and laws are followed. Tools and observation will use a 2 year-24 hour storm event for assessment
Soil Survey		
Flood hazard study		
NRCS National Engineering Handbook		
TR-20		
TR-55		

B.1.c Excess Amounts - Excess Subsurface Water

DEFINITION: Subsurface water accumulates in the soil profile, which adversely affects plant growth and production operations.

Excess Subsurface Water Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Soil Survey		Conservation practices are applied to solve discernable plant production and water quality problems consistent with all applicable federal, state, and local laws. Tools and observation indicate subsurface water does not restrict operational activities or cause discernable reduction in plant production.
NRCS National Engineering Handbook		
Irrigation evaluation		

B.1.d Inadequate Outlets

DEFINITION: Water conveyance channels and structures to collect and remove water from the land restrict the desired use of the land.

Inadequate Outlets Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Soil investigation		All water discharges are safely disposed of through stable outlets of adequate capacity and do not cause erosion, incised channels, unplanned deposition, or excess ponding of water. Tools and observation will use a 2 year-24 hour storm event for assessment.
Geologic investigation		
Hydrologic calculation		
Visual inspection		

B.1.e Water Management for Irrigated Land (includes supplemental irrigation, leaching, and frost protection).

DEFINITION: Inefficient and/or untimely utilization of existing water supplies restricts the desired use of the land.

Water Management for Irrigated Lands Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Farm Irrigation Rating Index (FIRI) Management factors, system management, scheduling/soil moisture, irrigation skill and action, maintenance, and soil condition shall be determined.	Sprinkler/Trickle Irrigation: • Quality Criteria is met when the product of these factors is greater than or equal to 0.80 of the potential efficiency as presented in the Washington Irrigation Guide.	Water is applied at an amount and timeliness to meet the needs of the crop. The management of the irrigation system shall be at a level to insure adequate irrigation water management is being applied under the control of the irrigator. The management of the irrigation system shall be at a level to insure adequate irrigation water management is being applied to conserve water under the control of the irrigator. When water delivery is beyond the irrigator's control, it is not considered when evaluating whether or not Quality Criteria is being met for irrigation water management.
(SRFR) – Surface Irrigation Simulation Model Management factors, system management, scheduling/soil moisture, irrigation skill and action, maintenance, and soil condition shall be determined.	Surface Irrigation: • Quality Criteria is met when the product of these factors is greater than or equal to 0.80 of the potential efficiency as presented in the Washington Irrigation Guide.	

B.1.f Water Management for Non-irrigated Land

DEFINITION: Inefficient management of precipitation and soil moisture restricts the desired use of the land.

Water Management for Non-Irrigated Land Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Soil moisture test		Management provides optimum use of natural moisture for the intended land use and is in balance with expected seasonally available moisture. It includes management and practices directed at increasing infiltration and decreasing evapotranspiration that comply with pertinent local, state, and federal laws, rules, and regulations. Tools and observations indicate land manager is utilizing localized precipitation and soil moisture to meet objectives and comply with pertinent local, state, and federal requirements.

Visual inspection		

B.1.g-h Restricted Capacity from Sediment Deposition in Small Water Conveyance - ONSITE, OFFSITE.

DEFINITION:
ONSITE-Onsite water quantity is affected by sediment deposition in onfarm drainage ditches, road ditches, culverts, and canals.
OFFSITE-Offsite Water quantity is affected by sediment deposition in drainage ditches, road ditches, culverts, and canals. Offsite practice effects are generally less than onsite because of increased distance.

Onsite & Offsite Restricted Capacity from Sediment Deposition Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Measurements of loss of capacity		Onsite and offsite capacities are restored, conveyances are maintained at design flow capacity, and the treated area does not contribute to the identified problem. Criteria will be consistent with policy and laws such as those pertaining to wetlands. Tools and observation identify sediment source areas and treat to meet quality criteria for soil erosion. Excessive sediment loads are controlled by the treatment methods selected.
Visual estimates of loss of capacity		

B.1.i. Restricted Capacity from Sediment Deposition - Water Bodies, Streams, and Lakes.

DEFINITION: Water quantity that is affected because of the loss of storage capacity as well as the loss of conveyance capacity.

Restricted Capacity for Sediment Deposition Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Measurements of loss of capacity		Loss of storage and/or conveyance capacity does not exceed designed or expected rates. Sediment source areas or potential source areas are identified and treated. Tools and observation identify sediment source areas and treat to meet quality criteria for soil erosion. Excessive sediment loads are controlled by the treatment methods selected.
Visual estimates of loss of capacity		

B.2. Water Quality

B.2.a Ground Water Contaminants – Pesticides

Definition: Water pollution problems from pesticides. Pesticide means "all" chemicals used to manage weeds, insects, and diseases. Pesticides degrade beneficial uses of ground water for human consumption, livestock watering or irrigation.

Pesticide Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Windows Pesticide Screening Tool (WIN-PST)	Low or Very Low Rating	Pesticides are applied following pertinent local, state, and federal regulations so those ground water standards are not violated. Pesticides are evaluated using risk analysis tools to minimize adverse environmental effects and applied in forms, at rates and during times so no significant contamination occurs below the root zone.

Pesticide Storage, Handling and Disposal Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Pesticide Storage, Handling, and Disposal Worksheet	Low or Low Moderate Rating or better	Pesticides are stored and disposed of following pertinent local, state, and federal regulations so those ground water standards are not violated. Pesticides are stored, handled, and disposed of to minimize risk of accidental spill or leakage.

B.2.b Ground Water Contaminants - Nutrients, Organics, and Animal Wastes

DEFINITION: Water pollution problems from natural or human-induced common nutrients of N, P, K, Ca, Na, and Mg and from animal and other wastes. Application of commercial fertilizers and animal wastes degrade beneficial uses of groundwater for human consumption or livestock watering.

Ground Water Contaminants-Nutrients and Organics Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Soil test	Agronomic rates	Commercial fertilizers and animal wastes are stored, applied, and disposed of following pertinent local, state, and federal regulations so that ground water standards are not violated. Application of nutrients and organics are in balance with plant requirements considering all nutrient sources, soil characteristics, realistic yield goals, and climatic factors. Federal, state, and local laws will be followed. Nutrients or animal wastes are applied at rates, forms, and times so no excessive leachate containing nutrients occurs below the root zone. Assume pathogens have the same potential for polluting groundwater as nitrate. Use tools to determine if nutrients and/or animal wastes are applied at rates, forms, and times along with mitigating practices so no excessive leachate containing nutrients occur below the root zone.
Phosphorus Index	Balance for P if appropriate	
Leaching Index	Monthly LI <=2	
Agricultural Waste Management Field Handbook	Use book values	

Fertilizer Storage and Handling Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Nutrient Storage and Handling Worksheet	Low to Moderate Rating or better	Fertilizer storage and handling (Commercial fertilizers) - Commercial fertilizers are stored, handled, and disposed of to minimize risk of accidental spill or leakage.

Livestock Waste Storage Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Livestock Waste Storage Worksheet	Low or Low Moderate Rating or better	Livestock waste storage facilities must be adequate to prevent significant loss from leaching and appropriately sized to safely store waste through environmentally unsafe periods to apply.

Livestock Confinement Area Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Livestock Confinement Area Management Worksheet	Low to Moderate Rating or better	Livestock Confinement Area - Livestock confinement areas are to be managed to minimize risk of leaching nitrate and pathogenic contaminants.

B.2.c. - Salinity

DEFINITION: Salts such as sodium, calcium, potassium, boron, and selenium over naturally occurring rates degrade beneficial uses of ground and surface water for human or livestock consumption, for irrigating crops, by creating saline conditions for freshwater aquatic plants and animals, and corroding equipment.

Ground Water Contaminants-Salinity Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Washington Irrigation Guide	Crop tolerance for specific crops	Electrical conductivity can be used as an indicator of excessive salinity or total dissolved salts. Taste can be used as an indicator in lieu of testing for total dissolved salts for drinking water. Salts reaching the ground water aquifers or surface water bodies do not exceed allowable standards established by federal, state, and local laws. Treated areas do not contribute contaminants at a level that adversely affects the groundwater or moves contaminant below the root zone.
Soil test (Electrical Conductivity-Ec)		
Client Interview	Increased salinity should not reduce agronomic crop yields by more than 10 percent	
Water test (Electrical Conductivity-Ec)	Drinking water 0.7 dS/M Plants 3.0 dS/M or crop tolerance	

B.2.d. - Heavy Metals and Other Organics

DEFINITION: Beneficial uses of ground and surface water are degraded by induced metals or metal compounds such as chromium, iron, lead, zinc, copper, and cobalt over naturally occurring rates or by the application of other organic wastes in municipal or industrial sludge (biosolids). Excessive concentrations of heavy metals can be toxic to humans, plants, and animals. Organics introduced from municipal or industrial sludge may affect taste, color, and safety of water used by humans and animals.

Ground Water Contaminants-Heavy Metals & Other Organics Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Management plan and NPDES permit	The application of domestic sewage sludge (biosolids) to agricultural lands is highly regulated. A state approved biosolids and domestic septage management plan and NPDES permit for the site is required in order to meet quality criteria.	Heavy metals and organics reaching a ground water aquifer or surface water body do not exceed allowable standards established by federal, state, and local laws.

B.2.e. Pathogens

DEFINITION: Pathogens such as bacteria, viruses, protozoans, parasites or fungi associated with animal wastes or animal health problems associated with beneficial uses of ground water.

Ground Water Contaminants- Pathogens Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
See nutrient indicator tools and nutrient criteria to determine if animals wastes are managed so there is no significant delivery of pathogens to ground water bodies		Pathogens reaching a ground water aquifer do not exceed allowable standards established by federal, state, or local laws, rules, and regulations..

B.2.f. Petroleum Products

DEFINITION: The quality of ground water and surface water can be severely degraded by contamination of petroleum products. In addition to health and safety, contamination of soil or water can result in expensive fines and liability for clean-up.

Petroleum Products Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Petroleum Product Storage Worksheet	Low or Low to Moderate Rating	The quality of ground water and surface water can be severely degraded by contamination of petroleum products. In addition to health and safety, contamination of soil or water can result in expensive fines and liability for clean-up.

B.2.g Surface Water Contaminants – Pesticides

DEFINITION: Surface water pollution problems from pesticides. Pesticide means "all" chemicals used to manage weeds, insects, and diseases. Pesticides degrade beneficial uses of surface water by endangering human health, livestock and wildlife health, and aquatic life (plants and animals).

Surface Water Contaminants-Pesticides Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Windows Pesticide Screening Tool (WIN-PST)	Low or Very Low Rating	Pesticides are evaluated with risk analysis tools to minimize adverse environmental effects and applied in form, at rates and during times so no significant transport occurs beyond the edge of the field. Pesticides are applied according to all federal, state, and local laws.

Pesticide Storage, Handling and Disposal Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Pesticide Storage, Handling, and Disposal Worksheet	Low or Low to Moderate Rating	Pesticides are stored, handled, and disposed of to minimize risk of accidental spill or leakage.

B.2.h Surface Water Contaminants - Nutrients and Organics and Animal Wastes

DEFINITION: Surface water pollution problems that result from the use of all applied plant nutrients, including animal and other wastes. Application of commercial fertilizers and animal wastes degrade beneficial uses of surface water for human consumption and safety, for livestock watering, and to support aquatic life (animals and plants).

Surface Water Contaminants Nutrients, Organics, and Animal Wastes Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Soil test	Agronomic rates	Nutrients or animal wastes are applied at rates, forms, and times so no significant runoff or subsurface flows containing nutrients or pathogens occurs beyond field boundaries. Assume pathogens have the same potential for polluting surface water as nitrate. Application of nutrients and organics are in balance with plant requirements considering all nutrient sources, soil characteristics, optimum yields, runoff loss potential of nutrients dissolved in the runoff water and/or attached soil particles transported by water and wind, and proximity to the water body. Commercial fertilizers and animal wastes are stored, applied, and disposed of following pertinent local, state, and federal regulations so that surface water standards are not violated. No significant runoff or subsurface flows containing nutrients or animal wastes occurs beyond field boundaries.
Phosphorus Index	Balance for P if appropriate	
Client Interview		
Agricultural Waste Management Field Handbook (AWMFH)	Use book values	
NRCS Water Quality Indicators Guide: Surface Waters-Field Sheet 2B	Good Rating	

Fertilizer Storage and Handling Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Nutrient Storage and Handling Worksheet	Low or Low to Moderate Rating	Commercial fertilizers are stored, handled, and disposed of to minimize risk of accidental spill or leakage.

Livestock Waste Storage Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Livestock Waste Storage Worksheet	Low to Moderate Rating or better	Livestock waste storage facilities must be adequate to prevent significant loss from surface loss and appropriately sized to safely store waste through environmentally unsafe periods to apply.

Livestock Confinement Area Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Livestock Confinement Area Management Worksheet	Low to Moderate Rating or better	Livestock confinement areas are to be managed to minimize risk of contaminated runoff of nitrate and pathogenic contaminants.

B.2.i. Surface Water Contaminants Suspended Sediments and Turbidity

DEFINITION: Beneficial uses of surface water are degraded because of excessive sedimentation and turbidity which can be deleterious to fish or other aquatic life or injurious to public health, recreation, and industry.

Surface Water Contaminants - Sediment/Turbidity Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Sediment and Turbidity Worksheet	Low to Moderate Risk	Observation, tools and soil erosion criteria are used to determine whether soils, organic wastes, drains, ditches and streams are managed so there is no excessive delivery of sediments or organics to surface water bodies. Sedimentation and turbidity must meet surface water quality standards established by federal, state, or local regulations. Quality criteria for soil erosion sheet and rill, wind, concentrated flow, classic gully, streambank, irrigation-induced, soil mass movement, roadbanks, construction sites or scour areas should be met in order to control sediment.
NRCS Water Quality Indicators Guide: Surface Waters-Field Sheet 1B	Good rating	

B.2.j. Surface Water Contaminants Low Dissolved Oxygen

DEFINITION: Beneficial uses of surface waters to support aquatic organisms including fish, invertebrates, and algae are negatively impacted by low levels of dissolved oxygen.

Surface Water Contaminants - Dissolved Oxygen Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Water Monitoring	State Standard-Temperature, DO, turbidity, nutrients, and sediments.	Dissolved oxygen levels meet or exceed standards established by federal, state or local regulations. Use monitoring data and observation to determine if water temperature, nutrients and organics, flow regime, sediment and turbidity and stream channel characteristics are managed to not contribute to low dissolved oxygen levels. Quality criteria for nutrients, sediment and turbidity, temperature, and aquatic habitat are used to indicate whether suitable dissolved oxygen levels exist.

B.2.k. Surface Water Contaminants Salinity

DEFINITION: Salts such as sodium, calcium, potassium, boron, and selenium and naturally occurring rates degrade beneficial uses by creating saline conditions.

Surface Water Contaminants - Salinity Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Water test	Drinking Water <0.7; Aquatic Plants < 3.0 dS/M; Crops < 3.0 dS/M or Crop Salt Tolerances	Salts reaching surface water bodies do not exceed allowable standards established by federal, state, and local regulations.
Soil test		
Crop yield history	Increased salinity should not reduce agronomic crops yield by more than 10 percent.	
Washington Irrigation Guide	Drinking Water <0.7; Aquatic Plants < 3.0 dS/M; Crops < 3.0 dS/M or Crop Salt Tolerances	

B.2.l. Surface Water Contaminants -Heavy Metals

DEFINITION: Beneficial uses of surface water are degraded by induced metals or metal compounds such as chromium, iron, lead, zinc, copper, and cobalt over naturally occurring rates or by the application of other organic wastes in municipal or industrial sludge (biosolids). Excessive concentrations of heavy metals can be toxic to humans, plants, and animals.

Surface Water Contaminants - Heavy Metal Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Soil test	State standards	The application of domestic sewage sludge (biosolids) to agricultural lands is highly regulated. A state approved biosolids and domestic septage management plan and NPDES permit is required for the site in order to meet quality criteria. The potential for heavy metals and organics reaching a surface water body do not exceed allowable standards established by federal, state and local laws.
Biosolids Test	State standards	
Soil Survey	Low Risk	

B.2.m. Surface Water Contaminants -Temperature

DEFINITION: Water temperature, impacted by human inputs, does not support intended beneficial uses.

Surface Water Contaminants - Temperature Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Water test	State standards	Water temperatures will be suitable for the intended uses and meet or exceed standards established by federal, state or local regulations. Indicators for stream temperature also include suitable aquatic habitat, and the geomorphic condition of the stream.
Shade/Canopy Cover	60-80% where the site supports trees	

B.2.n. Surface Water Contaminants -Pathogens

DEFINITION: Pathogens such as bacteria, viruses, protozoan, parasites, or fungi associated with animal wastes create human or animal health problems associated with beneficial uses of surface waters.

Surface Water Contaminants - Pathogens Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
		Pathogens reaching a surface water body do not exceed allowable standards established by federal, state and local laws. Use predictive tools and observation to determine if animal wastes are managed so there is no significant delivery of pathogens to surface waterbodies. Meeting quality criteria for nutrients will minimize risks of pathogen contamination when livestock waste is being utilized.

B.2.o. Surface Water Contaminants -Aquatic Habitat Suitability

DEFINITION: The quality of surface waters to support aquatic life is limited by inadequate habitat. Habitat suitability includes riparian habitat, thermal conditions, flow regime, stream morphology, and floodplain function. Invertebrates, amphibians and fish as well as other aquatic and terrestrial species require adequate habitat suitability to survive and prosper.

Surface Water Contaminants - Aquatic Habitat Suitability Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Aquatic and Terrestrial Habitat Evaluation Procedures	Stream-75% Riparian Area-75% Wetland-75%	Water bodies provide suitable habitat for plants and animals of concern to grow, reproduce and perpetuate at sustainable levels. Aquatic habitat and water temperature meet or exceed standards established by federal, state and local regulations. Use observation and tools to determine if anthropogenic (human activity) inputs significantly impact the aquatic health and riparian/wetland function of surface water bodies.
Stream Visual Assessment Protocol; National Water and Climate Center Technical Note 99-1	Good (7.5 score or better)	

B.2.o. Surface Water Contaminants -Petroleum Products

DEFINITION: The quality of surface waters can be severely degraded by contamination with petroleum products.

Surface Water Contaminants - Petroleum Storage and Handling Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Petroleum Product Storage Worksheet	Low to Moderate Risk or better	Petroleum products are stored and handled following pertinent federal, state and local regulations.

C. AIR

C.1. Air Quality

C.1.a d. Airborne Sediment and Smoke Particulates: Onsite Safety, Offsite Safety, Onsite property, Offsite Property.

DEFINITION: Airborne sediment and smoke particles causing safety problems. Airborne sediment and smoke particles causing visibility, machinery and/or vehicle and structure problems.

Airborne Sediment and Smoke Particles causing Visibility, Safety, Machinery, Vehicle, or Structure Problems Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
On-site visual		Treated area does not adversely affect the design life of equipment, buildings, and appurtenances, the functioning of conveyance structures, reduced visibility on public roads, or result in vehicular accidents. Applicable federal, state, or local laws and regulations will be followed. Tools and observation indicate that dust, smoke, and airborne sediment do not adversely affect the design life of equipment, buildings, and appurtenances, the functioning of conveyance structures, reduce visibility on public roads, or result in vehicular accidents. Tools and observation identify sediment source areas and treat to meet quality criteria for soil erosion and other related resource concerns. Excessive sediment loads are controlled by the treatment methods selected.
Off-site visual		
Accident records		
Monitoring equipment		
All applicable air quality standards		

C.1.e-f Airborne Sediment Particulates - Onsite Health, Offsite Health

DEFINITION: Airborne sediment (PM<10) causing health problems.

Airborne Sediment Particles causing Health Problems Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
On-site visual		Treated area does not adversely affect visibility, human, or animal health. Applicable federal, state, or local laws and regulations will be followed. Tools and observation indicate that excessive dust and airborne sediments are not emitted during normal weather conditions for the area. Tools and observation identify emission source areas and treat to meet the quantitative criteria. Excessive PM<10 dust emissions are controlled by the treatment methods selected. Meeting the quality criteria for the soil erosion quality criteria may not meet air quality laws and concerns.
Off-site visual		
Monitoring equipment		
All applicable air quality standards		
WEQ for the planned or existing cover and amount during critical periods.	When the planning soils are PM10 list soils, the predicted erosion will be <= 50% of the planning soil T factor (Tons/acre/year) for the rotation	

C.1.e-f. Airborne Smoke Particulates - Onsite Health, Offsite Health

DEFINITION: Airborne smoke particulates causing health problems.

Airborne Smoke Particulates causing Health Problems Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
On-site visual		Treated area does not adversely affect visibility, human, or animal health. Applicable federal, state, or local laws and regulations will be followed. Smoke is not generated during unfavorable weather conditions. Tools and observation identify high-risk conditions. Excessive and untimely smoke emissions are reduced or eliminated by the treatment methods selected.
Off-site visual		
Monitoring equipment		
All applicable air quality standards		

C.1.g. Airborne Sediment Particulates: Conveyance

-DEFINITION: Airborne sediment particles causing conveyance problems in drainage ditches, road ditches, culverts, canals, and streams.

Airborne Sediment Particles causing Conveyance Problems Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
On-site visual		Treated area does not adversely affect the design life or the functioning of conveyance structures. Applicable federal, state, or local laws and regulations will be followed. Tools and observation indicate that sediment does not move in the field during normal weather conditions. Tools and observation identify sediment source areas and treat to eliminate soil erosion or eliminate movement into conveyance structures. Excessive sediment loads are controlled by the treatment methods selected.
Off-site visual		

C.1.h. Airborne Chemical Drift: Onsite/Offsite

DEFINITION: Airborne and above land surface applied pesticides and nutrients.

Airborne Chemical Drift Problems Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
On-site visual		State and local regulations pertaining to the application of the application of agricultural chemicals are followed. Airborne drift of agricultural chemicals will be minimal outside the target area.
Off-site visual		
Monitoring equipment		
Identified local conditions		
All applicable air quality standards		

C.1.i. Airborne Odors

DEFINITION: Objectionable odors from such sources as confined livestock, animal waste, waste storage areas, waste lagoons, and field application of animal waste and other organics.

Airborne Odor Problems Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
On-site visual		Treated area does not adversely affect community relations or have prolonged emissions of excessive odors. Applicable federal, state, or local laws and regulations will be followed. Tools and observations indicate that impact to neighbors from objectionable odors is minimal during application or storage. Tools and observation identify odor sources and treat to meet quality criteria. Excessive odors are controlled by the treatment methods selected.
On-site olfactory		
Monitoring equipment		
All applicable air quality standards		

C.1.j.-k. Airborne Fungi, Molds, Pollen, Other.

DEFINITION: Production and release of fungi, molds, and pollen by components of a practice.

Airborne Fungi, Molds, and Pollen Problems Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
On-site visual		Treated area does not adversely affect human or animal health. Applicable federal, state, or local laws and regulations will be followed. Tools and observation indicate that applied conservation practices and normal farming practices do not cause or generate excessive fungi, mold, and pollen emissions during normal weather conditions. Tools and observation identify sources and treat so that excessive emissions are controlled.
On-site olfactory		
Monitoring equipment		
Identified local conditions and concerns		
All applicable air quality standards		

C.2. Condition

C.2.a.-c. Air Temperature, Air Movement, Humidity

DEFINITION:
***Air Temperature*-Improper temperature for development of flora and fauna. Zone of influence from ground level to 10 times plant height.**
***Air Movement*-Improper air movement for flora and fauna. Zone of influence from ground level to 10 times plant height.**
***Humidity*- Improper level of humidity for flora and fauna health.**

Air Temperature Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Monitoring		Adverse effects on plants and animals of concern are minimized or eliminated within identified planning considerations. Adverse impacts are identified and minimized using appropriate practices such as windbreaks, windstrips, etc.
Client interview		
Professional judgement		
Identified local conditions		

D. PLANTS

D.1. Suitability

D.1.a. Plants Not Well Adapted to Site

DEFINITION: Plants are not adapted to soil and climatic conditions of the area.

Plants Suitability-Not Adapted Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Visual inspection		Tools and observation indicate the plant cover and mitigating practices result in adequate protection of other resources. Select species or varieties that are better adapted or modify site conditions to meet plant needs. When established plants are not well adapted and a client does not choose to change the plant(s), land use, or modify the site, criteria will be met as long as other resources are not adversely affected.
Client interview		
NRCS-WA Plant Materials Technical Notes		
Washington and Oregon Guide for Conservation Seedings and Plantings		
Soils Interpretations		
Ecological site descriptions including Forage Suitability Groups		
Windbreak Handbook		
Washington Irrigation Guide		
Trend Evaluations	Planned Trend is *Positive* and/or Range Trend is *Toward*	

D.1.b. Plants Unsuitable for Intended Use

DEFINITION: Plant of concern does not meet the needs and objectives of the manager, such as by providing quantity and quality of desired food or forage, controlling erosion, improved soil condition, conserving water, adding beauty, providing habitat for animals and increasing crop or timber production.

Plants Unsuitable for Intended Use Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
NRCS-WA Plant Materials Technical Notes		Managed species are the appropriate species for intended use, within site condition constraints. Tools and observation indicate plant(s) selected or being managed is suitable for the intended use and client objectives. Adequate plant residues will be present to meet the quality criteria for Soil, Water, Air, Plants, and Animal resources
Washington and Oregon Guide for Conservation Seedings and Plantings		
Soils Interpretations		
Windbreak Handbook		
Washington Irrigation Guide		
Ecological Site Descriptions		

D.2. Conditions

D.2.a. Productivity (Kinds, Amounts, and Distribution)

DEFINITION: Plants do not provide the quantity and quality of crops, forage, fiber, cover, and habitat in the amount and timeliness of production needed.

Plant Productivity Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
NRCS-WA Plant Materials Technical Notes		*Cropland, Hayland, Pastureland, and Seeded Rangeland;* Average crop production is sufficient in quality and quantity to meet landowner's objectives and protect other components of the resource base. *Rangeland;* Key plants are properly used. The rangeland trend is "Toward" and/or the planned trend is "Positive". Rangeland trend or planned trend may be "Not Apparent" when the reference plant community similarity index is greater than 50%. Rangeland Health Evaluation Biotic Integrity attribute rating of *"Intact"* *Forestland (Ungrazed);*Trees are well distributed, vigorous, relatively free of insects, disease, and other damage, and the density of the stand is within 25 percent of Forest Stand Density Guide spacing on a stems-per-acre basis *Forestland (Grazed);* Trees are well distributed, vigorous, relatively free of insects, disease, and other damage, and the canopy of native tree species in the stand is 10% or greater. The forest environment provides for the perpetuation and reproduction of principal plant species natural to the site. Understory plant community is greater than 50% similarity index of expected plant communities. Planned trend is positive. *Wildlifeland, Recreationland, and Other Land;* Adapted or native plants are in sufficient quantity and quality for the intended land use. Tools and observations indicate adequate plant residues will be present to meet the quality criteria for Soil, Water, Air, other Plant, and Animal resource concerns.
NRCS Forest Stand Density Guide	Within 25 percent of spacing on a stems-per-acre basis	
NRCS National Forestry Manual		
NRCS National Range and Pasture Handbook		
Similarity Index	Similarity Index >50%	
Rangeland Health Ecological Indicator Evaluation Matrix	Rangeland Health Evaluation Biotic Integrity attribute rating of "Intact"	
Trend Evaluations	Planned Trend: Positive. Rangeland Trend: Toward.	
Forage Utilization Procedures	Properly Utilized-Frequency, Timing, Duration, and Intensity	
Ecological Site Descriptions		

D.2.b Health and Vigor

DEFINITION: Plants do not manufacture sufficient plant food to continue the growth cycle or to reproduce.

Plants Health and Vigor Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Visual inspection		Plants do not show evidence of stress due to lack of management, and growth is not impaired due to weeds, diseases, or insects. Plant growth is vigorous. Tools and observations indicate plants do not exhibit poor growth or poor form. Insect, disease or other damage are not above acceptable levels
Monitoring		
Client interview		

D.2.c1 Plant Damage by Wind Erosion

DEFINITION: Plants are damaged by wind erosion.

Plant Wind Erosion Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Visual inspection	Plant production (yields, plant cover and habitat) shall average >=80% of the potential for the planning soil or >=80% of the client's target.	Plant damage by wind erosion does not result in significant yield or stand reductions. Tools and observations indicate blowing soil particles do not damage seedlings. Plant yields are not reduced below acceptable levels. Adequate plant residues will be present to meet the quality criteria for Soil, Water, Air, other Plant, and Animal resource concerns.
Monitoring		
Client interview		
WEQ		

D.2.c2 Corridor Enhancement, Riparian Cover

DEFINITION: Trees and/or shrubs located adjacent to watercourses or water bodies do not provide the functions of shade, detritus source, large woody debris, wildlife habitat, filter surface and shallow ground water flow, and protection against scour erosion.

Corridor Enhancement, Riparian Cover Indicator Tools	**RMS Quality Criteria Level-Quantitative**	**RMS Quality Criteria Level-Qualitative**
Aquatic and Terrestrial Habitat Evaluation Procedures	Stream-75% Riparian Area-75% Wetland-75%	Stream corridors provide suitable habitat for plants and animals (terrestrial and aquatic) of concern to grow, reproduce and perpetuate at sustainable levels. Aquatic habitat and water temperature meet or exceed standards established by federal, state and local regulations. Use observation and tools to determine if anthropogenic (human activity) inputs significantly impact the aquatic health and riparian/wetland function of surface water bodies.
Stream Visual Assessment Protocol; National Water and Climate Center Technical Note 99-1	Good (7.5 score or better)	

D.3. Management

D.3.a. Establishment, Growth, and Harvest

DEFINITION: The management scheme or plan does not provide the proper techniques and timing to meet the plant needs of establishment, growth, and harvest.

Plant Management Field Application Indicator Tools	**RMS Quality Criteria Level-Quantitative**	**RMS Quality Criteria Level-Qualitative**
Applicable areas of FOTG		**Establishment** - Management including seeding dates, seedbed preparation for selected species, planting, fertility, and weed control are based on the FOTG. **Growth and Harvest** - Plants manufacture sufficient plant food to complete their growth cycle, including natural regeneration where applicable and are harvested in a timely manner to sustain productivity. Tools and observations indicate harvesting of perennial species occurs at a frequency, intensity, duration, and timing that meet the criteria for “plant condition” and “plant production”. Harvest of accumulated plant materials is accomplished in a manner that provides for the long-term sustainability of the plant resource.
NRCS National Range and Pasture Handbook		
NRCS National Forestry Manual		

D.3.b. Nutrient Management

DEFINITION: The correct amount of plant nutrients exceeds or is not available to meet plant needs.

Nutrient Management Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Soil Test	Agronomic rates	Nutrients are available to meet the needs of plants without having adverse effects on other resources. Tools and observations indicate nutrient application is based on a realistic yield goal and considers all nutrient sources. Nutrients are applied at rates and times along with mitigating practices so no excessive leachate or runoff containing nutrients occurs below the rootzone or beyond field boundaries.
Tissue Test	Agronomic rates	
University Fertilizer Guide Sheets	Agronomic rates	
Phosphorus Index	Balance for P if appropriate	
Agricultural Waste Management Field Handbook	Use book values	

D.3.c. Pests - Brush, Weeds, Insects, Diseases, and Fungi

DEFINITION: Pests are not managed to meet the needs of the plants of concern and the manager's objectives and resource management objectives.

Plant Pests Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
PNW Cooperative Extension Service Publications		Pests are managed based on threshold levels where available to achieve the landowner's desired production without having adverse effects on other resources. Federal, state, and local pest control laws or regulations will be followed. Tools and observations indicate the planned treatment effectively reduces adverse impacts of pest to a level that production, condition, and plant quality goals are reached and maintained.
Visual inspection		
Weed Districts		
USDA-Forest Service, Forest and Range Experiment Station Bulletins		

D.3.d Threatened and Endangered Species (Includes Federally listed species, State listed species, unique species, etc.)

DEFINITION: Federal or state listed species occur on or near the site.

T&E Plants Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Washington Technical Note Plant Materials 20		Actions and procedures will conform to laws and established policy for all officially listed species. Use observation and tools to determine if anthropogenic (human activities) inputs will impact known or potential sites.
Field identification		

E. ANIMALS

E.1. Habitat (Domestic Animals)

E.1.a. Food (Domestic Animals)

DEFINITION: Quantity and quality of food are not provided to meet the seasonal requirements of domesticated animals.

Domestic Animal Food Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Client interview		Nutritional requirements of animals are met so that health, growth, reproduction, lactation and general well being is maintained. Tools indicate domesticated animals are in adequate condition; indicating a satisfactory nutritive plane from supplied forages and roughages.
Visual inspection of animals	Body Condition Score: Cattle BCS >= 4, Sheep BCS >=3	
Feed and Forage Balance Sheets or equivalent procedures, including Grazing Land Assessment Procedure (GLA)	>=0 (positive)	

E.1.b Shelter (Domestic Animals)

DEFINITION: Domestic animals are not provided adequate shelter for protection.

Domestic Animal Shelter Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Client interview		Cover and shelter are adequate to protect livestock from inclement weather. Tools indicate domestic animals are in adequate condition and mortality of adult and young animals is minimal during severe weather seasons and storms.
Visual inspection of animals		
Visual observation of mortality and weaning percentages		

E.1.c. Quantity and Quality of Drinking Water (Domestic Animals)

DEFINITION: Adequate quantities of water of required quality are not provided for domestic animals.

Quantity and Quality of Drinking Water for Domestic Animals Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
NRCS National Range and Pasture Handbook		Water supply is adequate, of sufficient quality, free of fecal contamination, and is properly distributed to meet daily needs of species of concern. Tools indicate that animal performance is not being negatively impacted during the year. Grazing utilization is not heavy-severe at watering points while significant areas of the field/pasture are not utilized. The other resources near the watering facility meet the pertinent quality criteria.
Observations of animal behavior		
Forage Utilization Procedures		
Visual inspection of soil and vegetative conditions at water facilities		
Feed and Forage Balance Sheets or equivalent procedures, including Grazing Land Assessment Procedure (GLA)		
Visual inspection of quantity and/or quality of water facilities		

E.1. Habitat (Wildlife)

E.1.a.-c. Food, Cover or Shelter, Quantity and Quality of Drinking Water (Wildlife).

DEFINITION:
Food-Quantity and quality of food are not provided to meet the seasonal requirements of the species of concern.
Cover or Shelter-Adequate wildlife cover for the species of concern is not provided.
Quantity and quality of drinking water-Adequate quantities of water of required quality are not provided for the species of concern.

Wildlife Habitat Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Aquatic and Terrestrial Habitat Evaluation Procedures	Habitat quality will meet the following minimum levels:	Planned area will meet minimum level of habitat quality relative to the potential set by the landuse of the area.
Cropland and Hayland	**40%**	
Pastureland	**50%**	
Rangeland	**60%**	
Woodland	**60%**	
Aquatic Habitats and Wildlifeland (Includes Riparian, Freshwater Wetlands, Ponds, Lakes, Reservoirs, Streams, Saltwater Wetlands, and Intertidal Zones, etc.)	**75%**	

E.1.d Threatened and Endangered Species (includes Federal listed species, State listed species, unique species, etc.)

DEFINITION: Federal or state listed species occur on or near the site.

T&E Species Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
T&E species map and databases		Actions and procedures will conform to laws and established policy for all officially listed species. Use observation and tools to determine if anthropogenic (human activities) inputs will impact known or potential species and/or their habitat needs.
Field identification		

E.2. Management

E.2.a. Population/Resource Balance

DEFINITION: Numbers and kinds of domestic animals and wildlife are not in balance with feed, forage, space, and habitat requirements.

Population Resource Balance Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Aquatic and Terrestrial Habitat Evaluation Procedures		Numbers and kinds of domestic and wild animals do not exceed the habitat's carrying capacity unless the decision-maker does not have legal control of wild animal numbers. Tools indicate no readily discernible imbalance as indicated by overuse of the entire field/pasture/habitat, uneven utilization patterns, or by adversely impacted wildlife species.
Feed and Forage Balance Sheets or equivalent procedures, including Grazing Land Assessment Procedure (GLA)	>=0 (positive)	
Forage Utilization Procedures		
Visual observation and client interview		

E.2.b. Animal Health

DEFINITION: Proper attention is not given to the health of the animal of concern. This includes such considerations as diseases, parasites, and insects.

Animal Health Field Application Indicator Tools	RMS Quality Criteria Level-Quantitative	RMS Quality Criteria Level-Qualitative
Visual inspection		A suitable domestic and wildlife habitat is provided for viable populations of animals of concern or interest and this meets life cycle and reproductive requirements as appropriate. Tools indicate the adverse effect of poisonous plants, disease, parasites, insects or adverse environmental conditions caused by management are at or below threshold levels of concern.
Animal productivity		
Client interview		

FOTG REFERENCED TOOLS

FOTG referenced tools	ACCESS
Agricultural Waste Management Field Handbook (AWMFH): provides specific guidance for planning, designing, and managing systems where agricultural wastes are involved. It can help the professional planner/designer assist agricultural producers in organizing a comprehensive plan that results in the integration of waste management into overall farm operations.	• NRCS National Engineering Handbook, 210-VI, Part 651 http://www.ftw.nrcs.usda.gov/awmfh.html
All applicable air quality standards	• Washington State Air Quality Regulations http://www.ecy.wa.gov/laws-rules/ecywac.html#air • Washington State Air Quality Program http://www.ecy.wa.gov/programs/air/airhome.html • FOTG Section 1, State/Local Laws, Ordinances, Regulations • EPA Ambient Monitoring Technology Information Center http://www.epa.gov/ttn/amtic/
Alutin method	A simple method for an immediate estimate of soil loss with minimum calculation dates back to 1937, when A.N. Alutin of the Soil Conservation Service pioneered it. A fixed-length transect is set out across the slope, and the cross-section area of each rill along the line is calculated from average width and average depth and summed. In the original units the transect was 13.7 feet, and the total cross-section of rills in square inches is numerically equal to the total soil loss in tons/acre (Hill and Kaiser 1965). This assumes a soil bulk density of 1.5. NRCS-WA Agronomy Technical Note 7

FOTG referenced tools	ACCESS
Animal productivity	• National Range and Pasture Handbook, Chapter 6, Livestock Nutrition, Husbandry and Behavior National Range and Pasture Handbook, Chapter 8, Wildlife Management on Grazing Lands http://www.ftw.nrcs.usda.gov/pdf/NRPH.PDF • Technical Support for the NIRS/NUTBAL Nutritional Management System ftp://ftp.ftw.nrcs.usda.gov/pub/glti/Nutbalbk.pdf http://www.ftw.nrcs.usda.gov/glti/homepage.html • NUTBAL program http://servicecenter.usda.gov/release/ • BODY CONDITION SCORE
Aquatic and Terrestrial Habitat Evaluation Procedures	• NRCS-WA Biology Technical Note 14
Auger	• Identification of Soil Compaction and Its Limitations to Root Growth, NebGuide G-87-831A, A. J. Jones, Extension Soil Erosion Control/Conservation Tillage Specialist E. C. Dickey, Extension Agricultural Engineer—Conservation D. D. Eisenhauer, Extension Irrigation Specialist R. A. Wiese, Extension Soils Specialist http://ianrwww.unl.edu/pubs/Soil/g831.htm • NRCS Soil Quality Information Sheets http://www.statlab.iastate.edu/survey/SQI/sqiinfo.html Soil Quality Institute Urban Technical Note Series-Note 2: Urban Soil Compaction http://www.statlab.iastate.edu/survey/SQI/urban.shtml
Bank Erodibility Hazard Rating Guide (Rosgen 1990)-BEHI	• http://www.wildlandhydrology.com/assets/Streambank_erosion_paper.pdf
Bank Height Ratios (Rosgen 1990)	• http://www.wildlandhydrology.com/assets/Streambank_erosion_paper.pdf

FOTG referenced tools	ACCESS
Biosolids Test	• PNW508 Fertilizing with Biosolids, D. Sullivan, June 1998 http://eesc.orst.edu/agcomwebfile/edmat/PNW508.pdf • General Permit for Biosolids Management http://www.ecy.wa.gov/programs/swfa/biosolids/ • Chapter 173-308 WAC, Biosolids Management, http://www.ecy.wa.gov/biblio/wac173308.html • Worksheet for Calculating Biosolids Application Rates in Agriculture, Dan Sullivan and Craig Cogger, Oregon State University and Washington State University-Puyallup, http://www.css.orst.edu/News/Publicat/Sullivan/default.html
Body Condition Score	• BODY CONDITION SCORE http://www.ansi.okstate.edu/EXTEN/BEEF/I-224.pdf • see Animal Productivity
Bulk density measurement	• The Soil Quality Test Kit, http://www.statlab.iastate.edu/survey/SQI/overview.html • See Auger, Penetrometer, Shovel, Compaction
Channel Stability (Pfankuch) Evaluation	• http://www.wildlandhydrology.com/CHANNEL_STABILITY_.pdf •
Compaction	• Soil Quality Institute Urban Technical Note Series-Note 2: Urban Soil Compaction http://www.statlab.iastate.edu/survey/SQI/urban.shtml • See Auger, Penetrometer, Shovel, Bulk Density •
Direct Volume Method	• (Width(yd.)*Depth(yd.)*Length(yd.)*average bulk density (1.5)*1685)/2000=Tons or • (Width(ft.)*Depth(ft.)*Length(ft.)*average bulk density (1.5)*62.4)/2000=Tons

FOTG referenced tools	ACCESS
Ecological Site Descriptions	• National Range and Pasture Handbook, Chapter 3 http://www.ftw.nrcs.usda.gov/pdf/NRPH.PDF • NRCS National Forestry Manual, Part 537.31 http://nsscnt.nssc.nrcs.usda.gov/nfm/ • Ecological Site Information System (ESIS) http://plants.usda.gov/esis/index.html
ERO	•
Feed and Forage Balance Sheets or equivalent procedures including Grazing Land Assessment Procedure (GLA)	• National Range and Pasture Handbook, Chapter 5 http://www.ftw.nrcs.usda.gov/pdf/NRPH.PDF • Prescribed Grazing Using Grazing Land Application Software ftp://ftp.ftw.nrcs.usda.gov/pub/glti/GLAguide.pdf GLA program http://servicecenter.usda.gov/release/
FIRI Farm Irrigation Rating Index FIRS is used to: plan water management improvements; estimate amount of water conserved; and to estimate the amount of runoff and or deep percolation Farm Irrigation Rating System (FIRS) is a DOS program based on the WNTC Farm Irrigation Rating Index (FIRI). The model allows for a uniform and objective evaluation method for planning or evaluating irrigation water conservation components and their application benefits or lack there-of. For further or more detailed information pertaining to the rating elements and factor assignment, refer to the WNTC FIRI publication or model documentation with the download.	http://servicecenter.usda.gov/release/
Flood hazard study	• Federal Emergency Management Agency http://www.fema.gov/maps/ • NRCS-FOTG Section 1, References • Local government agencies
Floodplain maps	• Federal Emergency Management Agency http://www.fema.gov/maps/ • NRCS-FOTG Section 1, References • Local government agencies

FOTG referenced tools	ACCESS
Forage Utilization Procedures	• National Range and Pasture Handbook, Chapter 4 http://www.ftw.nrcs.usda.gov/pdf/NRPH.PDF • Utilization studies and residual movements http://www.ftw.nrcs.usda.gov/glti/pubs.html • National Range and Pasture Handbook, Chapter 4 & Appendix http://www.ftw.nrcs.usda.gov/pdf/NRPH.PDF
FURROW	•
FUSED (Furrow Sediment and Erosion Program): Version 1.89-2, USDA-NRCS, West National Technical Center, August 1988; modified by Washington State NRCS, July 1989	• NRCS-WA FOTG, Section I, References
Geologic investigation, including stream geomorphology	• National Engineering Manual, 210-V-NEM, Part 531 • Steam Corridor Restoration- Principles, Processes, and Practices; by the Federal Interagency Stream Corridor Working Group http://www.usda.gov/stream_restoration/
Gross Erosion Technique	• Alutin method • (Width(yd.)*Depth(yd.)*Length(yd.)*average bulk density (1.5)*1685)/2000=Tons or • (Width(ft.)*Depth(ft.)*Length(ft.)*average bulk density (1.5)*62.4)/2000=Tons
Hydrologic calculation	• NRCS-National Engineering Handbook Part 630 http://www.wcc.nrcs.usda.gov/water/quality/common/neh630/4content.html • Steam Corridor Restoration- Principles, Processes, and Practices; by the Federal Interagency Stream Corridor Working Group http://www.usda.gov/stream_restoration/

FOTG referenced tools	ACCESS
Irrigation evaluation	• NRCS Irrigation Training Toolbox http://www.wcc.nrcs.usda.gov/nrcsirrig/Irrigation_Training/Irrigation_Training_Toolbox/irrigation_training_toolbox.html • Water Management Models http://www.wcc.nrcs.usda.gov/nrcsirrig/Water_Management_Models/water_management_models.html http://servicecenter.usda.gov/release/ • Irrigation Manuals and Handbooks http://www.wcc.nrcs.usda.gov/nrcsirrig/Handbooks_Manuals/handbooks_manuals.html • EB1513 Irrigation Requirements for Washington - Estimates and Methodology. L.G. James, J.M. Erpenbeck, D.L. Bassett, and J.E. Middleton. This bulletin describes a method for estimating the irrigation requirements for Washington-grown crops. Includes mathematical formulas, extensive, detailed tables for reference, charts, and reference list. Revised 1989. 38 pages. $2.00 http://www.cahe.wsu.edu/infopub/eb1513/eb1513.htm • PNW0475 Soil Water Monitoring and Measurement; by Thomas W. Ley, Robert G. Stevens, Richard R. Topielec and W. Howard Neibling http://www.cahe.wsu.edu/infopub/pnw0475/pnw0475.html • SRFR Irrigation Efficiency Model http://www.wcc.nrcs.usda.gov/water/quality/common/wqmod.html http://servicecenter.usda.gov/release/ • Other Water Quantity Models http://www.wcc.nrcs.usda.gov/water/quality/common/wqmod.html
IWR Irrigation Water Requirements (Beta), IWR is a Windows 95 crop consumptive use program developed specifically for NRCS use in development of Consumptive Use Table for the new NRCS Irrigation Guide	• http://www.wcc.nrcs.usda.gov/nrcsirrig/Water_Management_Models/water_management_models.html
Leaching Index	• currently in NRCS-WA Water Quality Guide •
Livestock Confinement Area Management Worksheet	• NRCS-WA-Water Quality Technical Note 1 ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/Water_Quality_Technical_Notes/

FOTG referenced tools	ACCESS
Livestock Waste Storage Worksheet	• NRCS-WA-Water Quality Technical Note 1 ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/Water_Quality_Technical_Notes/
Monitoring equipment	• Washington State Air Quality Data http://airr.ecy.wa.gov/Public/aqn.html • Ambient Monitoring Technology Information Center http://www.epa.gov/ttn/amtic/
NEH: NRCS National Engineering Handbook	• NRCS Engineering discipline
NRCS Forest Stand Density Guide	• NRCS-WA Forestry Technical Note 10, November 1982 • ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/
NRCS National Forestry Manual The National Forestry Manual provides NRCS policy for forestland resource conservation planning (forestry and agroforestry). Then NRCS National Forestry Handbook is in draft form and will provide guidance on specific procedures.	• NRCS National Forestry Manual http://nsscnt.nssc.nrcs.usda.gov/nfm/ http://policy.nrcs.usda.gov/national/manuals/title190/
NRCS National Range and Pasture Handbook	• National Range and Pasture Handbook http://www.ftw.nrcs.usda.gov/pdf/NRPH.PDF
NRCS Water Quality Guide: Surface Waters	• http://www.wcc.nrcs.usda.gov/water/quality/frame/wqam/Guidance_Documents/guidance_documents.html • NRCS Water Quality Guide: Surface Waters, Terrene Institute, 1717 K Street NW, Suite 801, Wash. DC 20006 http://www.terrene.org/index.htm
NRCS Water Quality Indicators Guide: Surface Waters-Field Sheet 1B	• NRCS-WA-Water Quality Technical Note 1 ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/Water_Quality_Technical_Notes/ • NRCS Water Quality Guide: Surface Waters, http://www.wcc.nrcs.usda.gov/water/quality/frame/wqam/Guidance_Documents/guidance_documents.html • NRCS Water Quality Guide: Surface Waters, Terrene Institute, 1717 K Street NW, Suite 801, Wash. DC 20006 http://www.terrene.org/index.htm
Nutrient Storage and Handling Worksheet	• NRCS-WA-Water Quality Technical Note 1 ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/Water_Quality_Technical_Notes/

FOTG referenced tools	ACCESS
Penetrometer	• Identification of Soil Compaction and Its Limitations to Root Growth, NebGuide G-87-831A, A. J. Jones, Extension Soil Erosion Control/Conservation Tillage Specialist E. C. Dickey, Extension Agricultural Engineer—Conservation D. D. Eisenhauer, Extension Irrigation Specialist R. A. Wiese, Extension Soils Specialist http://ianrwww.unl.edu/pubs/Soil/g831.htm • NRCS Soil Quality Information Sheets http://www.statlab.iastate.edu/survey/SQI/sqiinfo.html
Pesticide Screening Tool-(WIN-PST) The USDA-NRCS National Water and Climate Center developed and supports the Windows Pesticide Screening Tool (WIN-PST). WIN-PST is a pesticide environmental risk screening tool that NRCS field office conservationists, extension agents, crop consultants, pesticide dealers and producers can use to evaluate the potential for pesticides to move with water and eroded soil/organic matter and to affect non-target organisms. WIN-PST is a graphical user interface computer program that runs in Windows 3.1 and Windows 95, 98 and NT	• WIN-PST http://www.wcc.nrcs.usda.gov/water/quality/common/pestmgt/winpst.htm http://servicecenter.usda.gov/release/
Pesticide Screening Tools-NAPRA National Agricultural Pesticide Risk Analysis (NAPRA) is an automated pesticide risk screening process that currently utilizes the USDA-Agricultural Research Service (ARS) environmental fate model GLEAMS (Groundwater Loading Effects of Agricultural Management Systems, Knisel et al., 1994). NAPRA results include climate specific probabilities of off-site pesticide loading and concentrations. These off-site pesticide concentrations are then compared to individual pesticide toxicity's to provide quantitative evaluation of the relative risks associated with different management options. As with GLEAMS, NAPRA evaluation is limited to the bottom of the rootzone and the edge of the field. NAPRA includes pesticide toxicity, because off-site pesticide loading by itself may not tell the whole story. For example, small off-site movement of a highly toxic pesticide, may in fact, pose greater environmental risk than large off-site movement of a marginally toxic chemical. NAPRA software utilizes acute and chronic toxicity values, for both human and aquatic species, allowing users to address multiple water resource concerns	Fact Sheet—NAPRA National Agricultural Pesticide Risk Analysis http://www.wcc.nrcs.usda.gov/water/factsheets/factfina.html http://www.wcc.nrcs.usda.gov/water/quality/common/pestmgt/napra.htm

FOTG referenced tools	ACCESS
Pesticide Storage, Handling, and Disposal Worksheet	• NRCS-WA-Water Quality Technical Note 1 ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/Water_Quality_Technical_Notes/
Petroleum Product Storage Worksheet	• NRCS-WA-Water Quality Technical Note 1 ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/Water_Quality_Technical_Notes/
Phosphorus Index	• NRCS-WA Water Quality Technical Note 2 • ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/Water_Quality_Technical_Notes/
Proper Functioning and Condition (PFC)	• 1737-9 Process for assessing proper functioning condition : Riparian area management 7/87 Prichard http://www.blm.gov/nstc/library/techref.htm • Steam Corridor Restoration- Principles, Processes, and Practices; by the Federal Interagency Stream Corridor Working Group http://www.usda.gov/stream_restoration/
Rangeland Health Ecological Indicator Evaluation Matrix	• National Range and Pasture Handbook, Chapter 3 http://www.ftw.nrcs.usda.gov/pdf/NRPH.PDF
RUSLE RUSLE 1.05 - Revised Universal Soil Loss Equation RUSLE is an erosion prediction model that predicts longtime average annual soil loss resulting from raindrop splash and runoff from specific field slopes in specified cropping and management systems and from rangeland. RUSLE is a replacement for the Universal Soil Loss Equation (USLE) and retains the six factors in that equation. These factors represent the rainfall and runoff factor (R), soil erodibility factor (K), slope length and steepness factors (LS), cover and management factor (C), and the support practices factor (P). Developed by the USDA-Agricultural Research Service, and first released in 1993, this technology has been implemented in field offices of the USDA-Natural Resources Conservation Service and is being used nationally and internationally for prediction of rill and interrill erosion on cropland, rangeland and other land uses. References for RUSLE are found in FOTG-Section I, Erosion Prediction and Agricultural Handbook Number 703, January 1997.	• Erosion Tools http://www.wcc.nrcs.usda.gov/water/quality/common/erosion/erosiontools.html http://servicecenter.usda.gov/release/ • WA-NRCS FOTG, section 1 http://www.wa.nrcs.usda.gov/FOTG/section1/RUSLEALL.HTML#Rusle Renard, K.G., Foster, G.R., Weesies, G.A., McCool, D.K., Yoder, D.C., 1997. Predicting soil erosion by water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE*).* U.S. Department of Agriculture, Handbook No. 703, 404 pp.

FOTG referenced tools	ACCESS
RUSLE-construction sites: RUSLE version 1.06	• Soil Quality Institute Urban Technical Note Series-Note 1: Erosion and Sedimentation on Construction Sites http://www.statlab.iastate.edu/survey/SQI/pdf/ • Erosion Tools http://www.wcc.nrcs.usda.gov/water/quality/common/erosion/erosiontools.html http://servicecenter.usda.gov/release/
Screening Tools-Farm-A-Syst Farm*A*Syst is a partnership between government agencies and private business that enables you to prevent pollution on farms, ranches, and in homes using confidential environmental assessments. Farm*A*Syst can help you determine what risks -- whether from livestock waste disposal, pesticide management or petroleum storage -- could threaten your family's health and financial security. A system of step-by-step factsheets and worksheets helps you to identify the behaviors and practices that are creating those risks. All information you gather is confidential. You decide what changes you need to make and when to make them. Some of the issues that Farm*A*Syst can help you address include: Quality of well water, new wells and abandoned wells Livestock waste storage Storage and handling of petroleum products Managing hazardous wastes Nutrient management	• Farm-A-Syst: http://www.uwex.edu/farmasyst/ http://servicecenter.usda.gov/release/
Sediment and Turbidity Worksheet	• NRCS-WA-Water Quality Technical Note 1 ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/Water_Quality_Technical_Notes/
Sediment loss from field	• Steam Corridor Restoration-Principles, Processes, and Practices; by the Federal Interagency Stream Corridor Working Group http://www.usda.gov/stream_restoration/ • USGS Suspended Sediment Database http://webserver.cr.usgs.gov/sediment/ • RUSLE construction sites

FOTG referenced tools	ACCESS
Shade/Canopy Cover	• Steam Corridor Restoration-Principles, Processes, and Practices; by the Federal Interagency Stream Corridor Working Group http://www.usda.gov/stream_restoration/
Shovel	• Identification of Soil Compaction and Its Limitations to Root Growth, NebGuide G-87-831A, A. J. Jones, Extension Soil Erosion Control/Conservation Tillage Specialist E. C. Dickey, Extension Agricultural Engineer—Conservation D. D. Eisenhauer, Extension Irrigation Specialist R. A. Wiese, Extension Soils Specialist http://ianrwww.unl.edu/pubs/Soil/g831.htm NRCS Soil Quality Information Sheets http://www.statlab.iastate.edu/survey/SQI/sqiinfo.html
Similarity Index	• National Range and Pasture Handbook, Chapter 4 http://www.ftw.nrcs.usda.gov/pdf/NRPH.PDF
Soil investigation	• National Soil Survey Handbook http://www.statlab.iastate.edu/soils/nssh/
Soil moisture test	• soil feel and appearance, gravimetric soil sampling, tensiometry, porous blocks, gypsum blocks, watermark blocks, neutron scattering, methods based on measurement of dielectric constant, time domain reflectometry, frequency domain reflectometry • Estimating Soil Moisture by Feel and Appearance http://www.ianr.unl.edu/pubs/irrigation/g690.htm • USDA-NRCS, Estimating Soil Moisture by Feel and Appearance http://www.wcc.nrcs.usda.gov/water/quality/common/neh652/ch15_b.pdf
Soil Survey	• Field Office Technical Guide-Section II • National Soil Survey Handbook http://www.statlab.iastate.edu/soils/nssh/ • National Soil Data Access Facility http://www.statlab.iastate.edu/soils/nsdaf/

FOTG referenced tools	ACCESS
Soil Test	• EC 0628 How to Take A Soil Sample...and Why http://eesc.orst.edu/agcomwebfile/edmat/EC628.pdf • EC1478 Soil Test Interpretation Guide; by E. S. Marx, J. Hart, and R. S. Stevens, reprinted August 1999 http://eesc.orst.edu/agcomwebfile/edmat/EC1478.pdf • EM 8650 Nutrient Management for Dairy Production: The Pre-Sidedress Soil Nitrate Test (PSNT) for Western Oregon and Western Washington, E. S. Marx, N. W. Christensen, J. Hart, M. Gangwer, C. G. Cogger, and A. I. Bary, reprinted August 1997 http://eesc.orst.edu/agcomwebfile/edmat/EM8650.pdf • EM 8677 A List of Analytical Laboratories Serving Oregon, J. Hart, revised April 2000 http://eesc.orst.edu/agcomwebfile/edmat/EM8677.pdf • Agricultural Waste Management Field Handbook, Chapter 13, Appendix B ftp://ftp.ftw.nrcs.usda.gov/pub/awmfh/chap13-app13b.pdf
Soils Interpretations	• Soil Survey • NRCS-WA FOTG, Section II • National Soil Survey Handbook http://www.statlab.iastate.edu/soils/nssh/
SRFR is a tool to help identify the optimum surface irrigation efficiencies from border, basin, and furrow irrigation utilizing a windows-type environment. It may be run from the DOS prompt or through the Windows DOS shell. The model is targeted for use by the field office technician and will provide graphical display of the efficiency and options evaluated. This is cooperative project with the ARS Water Conservation Laboratory in Phoenix, Arizona. **SRFR**	• http://www.wcc.nrcs.usda.gov/nrcsirrig/Water_Management_Models/water_management_models.html
Stream Visual Assessment Protocol; National Water and Climate Center Technical Note 99-1	• http://www.ftw.nrcs.usda.gov/pdf/svapfnl.pdf
T&E Species Maps and Databases	• Washington Natural Heritage Program http://www.wa.gov/dnr/htdocs/fr/nhp/
Tissue Test: nutrient analysis of plant samples	• Agricultural Waste Management Field Handbook, Chapter 13, Appendix B ftp://ftp.ftw.nrcs.usda.gov/pub/awmfh/chap13-app13b.pdf

FOTG referenced tools	ACCESS
TR-20 Technical Release No. 20: Computer Program for Project Formulation Hydrology (TR-20) is a physically based watershed scale runoff event model. It computes direct runoff and develops hydrographs resulting from any synthetic or natural rainstorm. Developed hydrographs are routed through stream and valley reaches as well as through reservoirs. Hydrographs are combined from tributaries with those on the main stream stem. Branching flow (diversions) and baseflow can also be accommodated.	• Hydrology/Hydraulics Tools http://www.wcc.nrcs.usda.gov/water/quality/text/hydrolog.html http://servicecenter.usda.gov/release/
TR-55 Technical Release 55 presents simplified procedures for estimating runoff and peak discharges with special emphasis on small urbanized or urbanizing watersheds.	• Hydrology/Hydraulics Tools http://www.wcc.nrcs.usda.gov/water/quality/text/hydrolog.html http://servicecenter.usda.gov/release/
Trend Evaluations	• National Range and Pasture Handbook, Chapter 4 http://www.ftw.nrcs.usda.gov/pdf/NRPH.PDF
University Fertilizer Guide Sheets	• Oregon State University http://eesc.orst.edu/agcomwebfile/edmat/ • • University of Idaho http://info.ag.uidaho.edu/Catalog/catalog_frm.htm
USDA-Forest Service, Forest and Range Experiment Station Bulletins	• USDA-Forest Service, Forest and Range Experiment Station Bulletins http://www.fs.fed.us/pnw/pubs.htm
Washington and Oregon Guide for Conservation Seedings and Plantings	• NRCS-WA FOTG, Section I, References
Washington Irrigation Guide	•
Washington Technical Note Agronomy 1	•
Washington Technical Note Engineering 1.	• USDA-NRCS-Washington State, Handbook of Engineering Design Aids, Volume III http://www.wa.nrcs.usda.gov/Eng/DesignAids/TechNote/index.htm
Washington Technical Note Plant Materials 20	• Washington Natural Heritage Program http://www.wa.gov/dnr/htdocs/fr/nhp/
Water Monitoring	• National Handbook of Water Quality Monitoring http://www.wcc.nrcs.usda.gov/water/quality/frame/wqam/Guidance_Documents/guidance_documents.html • Steam Corridor Restoration-Principles, Processes, and Practices; by the Federal Interagency Stream Corridor Working Group http://www.usda.gov/stream_restoration/

FOTG referenced tools	ACCESS
Water Quality Indicators Guide-Field Sheet 2b	• NRCS-WA-Water Quality Technical Note 1 ftp://ftp.wa.nrcs.usda.gov/pub/Technical_Notes/Water_Quality_Technical_Notes/ • NRCS Water Quality Guide: Surface Waters, http://www.wcc.nrcs.usda.gov/water/quality/frame/wqam/Guidance_Documents/guidance_documents.html • NRCS Water Quality Guide: Surface Waters, Terrene Institute, 1717 K Street NW, Suite 801, Wash. DC 20006 http://www.terrene.org/index.htm
Water Quality Laws	USGS Guide to Federal Environmental Laws and Regulations http://water.usgs.gov/eap/env_guide/h2o_quality.html
Water test	• NRCS National Handbook on Water Quality Monitoring http://www.wcc.nrcs.usda.gov/water/quality/frame/wqam/Guidance_Documents/guidance_documents.html • Chapters of the USGS National Field Manual for the Collection of Water Quality Data http://water.usgs.gov/owq/Fieldprocedures.html • see Water Quality Laws
Weed Districts Regulatory responsibility for ensuring compliance with the noxious weed laws have been assigned to local county noxious weed control boards and weed districts formed under these laws. The Washington Department of Agriculture has regulatory responsibility when no local program exists.	• Washington State Noxious Weed Control Board and County Boards http://www.wa.gov/agr/weedboard/index.html
WEPP The Water Erosion Prediction Project (WEPP) model is a process-based, erosion prediction model applicable to hillslope erosion processes (sheet and rill erosion), as well as simulation of the hydrologic and erosion processes on small watersheds.	Erosion Tools http://www.wcc.nrcs.usda.gov/water/quality/common/erosion/erosiontools.html
WEQ: Wind Erosion Equation An equation for predicting E, the average annual soil loss due to wind in mass per unit area per year, and is defined as $E=IKCLV$, where I is the soil erodibility factor, K is the soil ridge roughness factor, C is the local climatic factor, L is the field width, and V is the vegetative factor	• NRCS National Agronomy Manual-Final Draft • Erosion Tools http://www.wcc.nrcs.usda.gov/water/quality/common/erosion/erosiontools.html
Windbreak Handbook	• NRCS-WA FOTG, Section I, References